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Task Force on Broadcasting

Satellites and the broadcasting industry: Alternatives for the future

prepared by

Econotec Inc

February 1986

Econotec Inc.

Economistes—conseils
Economics consultants

February 17, 1986

Mr. Paul Audley,
Executive Director,
Task Force on Broadcasting Policy,
Department of Communications,
365 Laurier Avenue West,
Ottawa, Ontario.
K1A 0C8

Dear Mr. Audley,

Please find enclosed our final report that pertains to the role of satellites in the broadcasting industry. As agreed, the report covers an analysis of rates for satellite services, a description of the characteristics of the forthcoming generation of satellites, an analysis of the policy environment and finally the identification of alternatives for the future. The report also contains appendices related to Telesat's financial performance and the rates it charges for satellite services.

I sincerely hope that the findings of this report will enable the task force to develop recommendations that will enable Telesat to improve the role that it has been playing in the broadcasting industry of this country.

Hoping this is to your satisfaction, I remain,

Yours truly,

Michel Lafontaine,
Senior consultant.

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1. Rates for satellite services

1. Rates for satellite services

Telesat offers a variety of satellite services for which rates vary according to the following factors:

- Frequency band: 6/4 GHz or 14/12 GHz.
- Importance of usage: Full time or occasional.
- Bandwidth required: Full RF Channel or less than Full RF channel.

Carriage of television signals requires full RF channels in a full time or occasional mode while carriage of radio signals requires less than full RF channels; carriage of radio signals can also be achieved using a sub carrier of a television signal.

Since the main thrust of the present report is on full time distribution of television programs, rates for occasional use and for less than full RF channels will be presented in appendix (except for a remark on rates for the latter category which is presented in section 1.5). The rates for television service are presented starting on page 1–4 and were approved by the CRTC in Telecom Order 85–441 on July 12, 1985. The decision granted annual rate increases of 5.5% for each year starting January 1, 1986. Before describing these rates, we thought it might be useful to describe the capacity of Telesat's present satellite systems in the following table.

Present Capacity of Telesat's satellite systems

Satellite	Frequency band	Status	Nominal	Effective	Equivalent TV	Expected retirement
B	6/4 GHz	In use	12	12	12	1986
	14/12 GHz	Shut down	4	0	0	
C-1	14/12 GHz	Storage orbit	16	16	32	1993
C-2	14/12 GHz	In use	16	16	32	1992
C-3	14/12 GHz	In use	16	16	32	1991
D-1	6/4 GHz	In use	24	24	24	1990
D-2	6/4 GHz	Storage orbit	24	24	24	1993
Total	6/4 GHz		60	60	60	
(incl. B)	14/12 GHz		52	48	96	
Grand total			112	108	156	
Total	6/4 GHz		48	48	48	
(excl. B)	14/12 GHz		48	48	96	
Grand total			96	96	144	

1.1 Rates on Anik D (6/4 GHz): All Canada coverage.

The monthly rates for full period RF channel on Anik D (6/4 GHz) for the July 1, 1985 to December 31, 1990 period are presented in the following tables, on a monthly and annual basis for the three categories of service available which are:

- Fully protected: for this type of service, the company will provide a protection RF channel on the same or on another satellite in the event of service interruption.

- Unprotected non-preemptible: for this type of service, the company may at its discretion substitute another RF channel in the event of service interruption.

- Unprotected preemptible: for this type of service, the company may at its discretion substitute another RF channel in the event of service interruption. If Telesat has to restore a Fully protected channel and cannot find an unassigned channel, the present category will be preempted in favor of the protected channel.

MONTHLY RATES ON ANIK D IN 6/4 GHz

DATE		FULLY PROTECTED	UNPROTECTED NON-PREEMPTIBLE	UNPROTECTED PREEMPTIBLE
7/01/85	12/31/85	$ 175,364	$ 122,755	$ 111,064
1/01/86	12/31/86	$ 185,009	$ 129,507	$ 117,173
1/01/87	12/31/87	$ 195,185	$ 136,630	$ 123,618
1/01/88	12/30/88	$ 205,920	$ 144,145	$ 130,416
1/01/89	12/31/89	$ 217,245	$ 152,072	$ 137,589
1/01/90	12/31/90	$ 229,194	$ 160,436	$ 145,157

ANNUAL RATES ON ANIK D IN 6/4 GHz

DATE		FULLY PROTECTED	UNPROTECTED NON-PREEMPTIBLE	UNPROTECTED PREEMPTIBLE
7/01/85	12/31/85	$ 2,104,368	$ 1,473,060	$ 1,332,768
1/01/86	12/31/86	$ 2,220,108	$ 1,554,078	$ 1,406,070
1/01/87	12/31/87	$ 2,342,214	$ 1,639,553	$ 1,483,404
1/01/88	12/30/88	$ 2,471,036	$ 1,729,728	$ 1,564,991
1/01/89	12/31/89	$ 2,606,943	$ 1,824,863	$ 1,651,066
1/01/90	12/31/90	$ 2,750,325	$ 1,925,231	$ 1,741,874

1.2 Rates on Anik C (14/12 GHz): 1/2 or 1/4 Canada coverage.

The monthly rates for full period RF channel on Anik C (14/12 GHz) for the July 1st, 1985 to December 31st 1990 period are presented in the following tables, on a monthly and annual basis for the three categories of service available.

MONTHLY RATES ON ANIK C IN 14/12 GHz
1/2 OR 1/4 CANADA COVERAGE
2 TV PER CARRIER MODE

DATE		FULLY PROTECTED	UNPROTECTED NON-PREEMPTIBLE	UNPROTECTED PREEMPTIBLE
7/01/85	12/31/85	$ 127,620	$ 89,334	$ 80,827
1/01/86	12/31/86	$ 134,639	$ 94,247	$ 85,272
1/01/87	12/31/87	$ 142,044	$ 99,431	$ 89,962
1/01/88	12/30/88	$ 149,857	$ 104,899	$ 94,910
1/01/89	12/31/89	$ 158,099	$ 110,669	$ 100,130
1/01/90	12/31/90	$ 166,794	$ 116,756	$ 105,637

ANNUAL RATES ON ANIK C IN 14/12 GHz
1/2 OR 1/4 CANADA COVERAGE
2 TV PER CARRIER MODE

DATE		FULLY PROTECTED	UNPROTECTED NON-PREEMPTIBLE	UNPROTECTED PREEMPTIBLE
7/01/85	12/31/85	$ 1,531,440	$ 1,072,008	$ 969,924
1/01/86	12/31/86	$ 1,615,669	$ 1,130,968	$ 1,023,270
1/01/87	12/31/87	$ 1,704,531	$ 1,193,172	$ 1,079,550
1/01/88	12/30/88	$ 1,798,280	$ 1,258,796	$ 1,138,925
1/01/89	12/31/89	$ 1,897,186	$ 1,328,030	$ 1,201,566
1/01/90	12/31/90	$ 2,001,531	$ 1,401,072	$ 1,267,652

1.3 Rates on Anik C (14/12 GHz): Full Canada coverage.

Since rates in the two preceding tables allow only Half Canada coverage, the rates in these tables has to be multiplied by two for a service provider who wants full Canada coverage. This would be the case for a pay TV supplier such as First Choice for example which has to take into account time zones. The monthly rates for full Canada coverage on Anik C (14/12 GHz) for the July 1st, 1985 to December 31st 1990 period are presented in the following tables, on a monthly and annual basis for the three categories of service available.

MONTHLY RATES ON ANIK C IN 14/12 GHz
FULL CANADA COVERAGE
2 TV PER CARRIER MODE

DATE		FULLY PROTECTED	UNPROTECTED NON-PREEMPTIBLE	UNPROTECTED PREEMPTIBLE
7/01/85	12/31/85	$ 255,240	$ 178,668	$ 161,654
1/01/86	12/31/86	$ 269,278	$ 188,495	$ 170,545
1/01/87	12/31/87	$ 284,089	$ 198,862	$ 179,925
1/01/88	12/30/88	$ 299,713	$ 209,799	$ 189,821
1/01/89	12/31/89	$ 316,198	$ 221,338	$ 200,261
1/01/90	12/31/90	$ 333,588	$ 233,512	$ 211,275

ANNUAL RATES ON ANIK C IN 14/12 GHz
FULL CANADA COVERAGE
2 TV PER CARRIER MODE

DATE		FULLY PROTECTED	UNPROTECTED NON–PREEMPTIBLE	UNPROTECTED PREEMPTIBLE
7/01/85	12/31/85	$ 3,062,880	$ 2,144,016	$ 1,939,848
1/01/86	12/31/86	$ 3,231,338	$ 2,261,937	$ 2,046,540
1/01/87	12/31/87	$ 3,409,062	$ 2,386,343	$ 2,159,099
1/01/88	12/30/88	$ 3,596,560	$ 2,517,592	$ 2,277,850
1/01/89	12/31/89	$ 3,794,371	$ 2,656,060	$ 2,403,132
1/01/90	12/31/90	$ 4,003,062	$ 2,802,143	$ 2,535,304

1.4 DBS rates on Anik C

In addition, all the preceding rates for Anik C assume a 2 TV per carrier feature; in the eastern beam for example First Choice is carried along with Radio Québec on the same channel. Good quality reception in this preceding mode would normally require a 1.8 metre antenna.

But there is also a possibility of using Anik C in a DBS mode by using the full power of a channel for a single service; this is called the 1 TV per carrier mode and while it normally permits good quality reception with a 1.2 m antenna it would also effectively double the cost of providing television service in Canada. Assuming an unprotected non–preemptible channel, the following tables illustrates the rates that a user would have to incur for this type of service.

MONTHLY RATES ON ANIK C IN 14/12 GHz
DBS MODE (1 TV PER CARRIER)
UNPROTECTED NON–PREEMPTIBLE SERVICE

DATE		1/4 CANADA	1/2 CANADA	FULL CANADA
7/01/85	12/31/85	$ 178,668	$ 178,668	$ 357,336
1/01/86	12/31/86	$ 188,495	$ 188,495	$ 376,989
1/01/87	12/31/87	$ 198,862	$ 198,862	$ 397,724
1/01/88	12/30/88	$ 209,799	$ 209,799	$ 419,599
1/01/89	12/31/89	$ 221,338	$ 221,338	$ 442,677
1/01/90	12/31/90	$ 233,512	$ 233,512	$ 467,024

ANNUAL RATES ON ANIK C IN 14/12 GHz
DBS MODE (1 TV PER CARRIER)
UNPROTECTED NON–PREEMPTIBLE SERVICE

DATE		1/4 CANADA	1/2 CANADA	FULL CANADA
7/01/85	12/31/85	$ 2,144,016	$ 2,144,016	$ 4,288,032
1/01/86	12/31/86	$ 2,261,937	$ 2,261,937	$ 4,523,874
1/01/87	12/31/87	$ 2,386,343	$ 2,386,343	$ 4,772,687
1/01/88	12/30/88	$ 2,517,592	$ 2,517,592	$ 5,035,185
1/01/89	12/31/89	$ 2,656,060	$ 2,656,060	$ 5,312,120
1/01/90	12/31/90	$ 2,802,143	$ 2,802,143	$ 5,604,286

1.5 A remark on rates for less than full RF channels

As we said earlier, the rates for less than full RF channels are presented in appendix, since the main thrust of the present report is on distribution of television signals. But we hope the present remarks will shed some light on the effects of the present policy framework, which is characterized by the telecommunications industry's dominance of Telesat. Satellites, obviously, are especially effective in point to multi point applications, be they voice, data or video. One would think that satellites for example would be ideally suited for applications such as network feeds for the radio industry, distribution of wire services for newspapers and the broadcasting industry and in some cases private voice and data networks for large corporations and institutions like governments.

One would have thought that Telesat would have made a nice little business out of those services, since potential clients were screaming for such offerings, but this was not to be, since policy and regulatory factors prevented Telesat from leasing less than full RF channels for a long time while all of the applications listed above require, at best, one tenth to one twentieth of the capacity of a full RF channel.

Telesat finally introduced rates for such services in January of 1982, but the members of the task force will surely appreciate the fact that it took political intervention, in the form of an Order in Council (# 3456), passed in 1981, for Telesat to finally agree to provide a service for which its technical facilities are extremely well suited. We submit that under normal competitive conditions, this would have been one of the very first services, along with television services, that Telesat would have provided.

The members of the task will also surely appreciate the fact that even in defeat, the members of Telecom Canada had their day; yes they were forced to introduce less than full RF channel service, but as one can see in appendix, the rates for such a service are abnormally high because one has to subscribe to fully protected status for that service, the other categories (non preemptible and preemptible) not being offered by Telesat; and even the scale of rates itself seems to discriminate against small users.

The net result is that users that would require only 5% of a RF channel are charged the equivalent of 11% of a full channel in the non preemptible mode. If they use 30% of the capacity of the RF channel, they pay the equivalent of 60% of that channel. And if they get their usage up to 53% of the full RF channel, then they might as well lease a full channel, because they would pay exactly the same monthly amount of $129,507 in 6/4 GHz or $94,247 in 14/12 GHz.

And Telesat itself admits that these categories of services are probably the ones that are the most sensitive to price. As well higher growth in that segment would have an impact on the earth segment component of Telesat's revenues (uplink earth stations).

1.6 Comparison with U.S. rates.

A comparison of Telesat's rates with those offered on U.S. satellites was prepared and submitted by Telesat in October 1984 and is presented in Appendix D. It is difficult from this comparison to draw a clear cut conclusion about this comparison because of the following factors:

- Categories of service are not always identical and in some cases there are categories of service which exist in the U.S. but do not

exist in Canada.

- There are multiple satellite system in the U.S. which offer different categories of service and different rates.
- The fluctuations in the exchange rates makes any comparison even more difficult, although one could say that, generally speaking, the fall of the Canadian $ makes Telesat "look good", while any rise in our currency, vis-a-vis the U.S. $, would make Telesat "look bad".

In any case, we will submit what would seem to us to be the most important differences between Canadian and U.S. rates:

1- The competition between various U.S. operators has brought higher rates on satellites that are full of attractive programming, and lower rates on satellites that lack this attractive feature.

2- Long term and/or multiple transponder arrangements are reflected in lower rates for users.

3- There are rates in the U.S. which amount to an outright sale of a channel (the condominium in the sky approach).

4- While Telesat's rates would seem to be fairly competitive in the protected category of service, their rates would seem to be higher, at least in relative terms, in the non preemptible or preemptible categories of service.

1.7 Rate making methodology.

The concept behind rate making at Telesat seeks to recover capital and operating costs associated with a satellite system through rates that will also include an appropriate rate of return. It this thus a fairly simple one from the

economics point of view and it amounts to bringing the schedule of expenditures (capital and operating) to a net present value (NPV), through an appropriate discount rate, and then to finding the equivalent rates, based on utilization forecasts, that will recover this NPV of costs, including an appropriate rate of return.

Rates are developed separately for each satellite system (6/4 and 14/12 GHz), with common capital and operating costs allocated according to the importance of non common costs of each satellite system.

Once the overall revenue requirements are known, rates are then developed, for each satellite system, according to the value of service concept, by using appropriate weighting factors, for:

- Importance of usage: Full time or occasional.
- Bandwidth required: Full RF Channel or less than Full RF channel.

The rate making methodology would thus seem to be very similar to the one used in a telecommunications and telephony environment, and bears little relation to the cable environment for example where rates are also approved by the CRTC but where the process is a lot more flexible. This is obviously very understandable since Telesat is a member of Telecom Canada, but since Telesat's clientele and revenues are heavily weighted towards the broadcast and cable industries, we cannot help but ask whether it would not be a good idea to move Telesat out of the telecommunications side of the CRTC. More will be said about that later, but for now we will simply point out what would seem to be the more questionable consequences of the rate making process.

The rate making process gives less flexibility than Telesat would require, taking into account the planning time frames that it has to face and that are much more important than in the rest of the telecommunications industry;

Telesat cannot add or reduce its capacity very easily and it should have more flexibility in increasing or lowering rates to adjust the level of demand to the existing capacity at any given point in time.

The distinction made between rates for each satellite system (6/4 and 14/12 GHz) is an arbitrary one, (whose requirement will probably disappear anyhow with the forthcoming generation of satellites) and it further reduces Telesat's flexibility in terms of matching capacity with demand. The same can also be said about the weighting factors, especially those used to develop rates for partial channel service.

In general thus, we think that while keeping the same overall revenue requirements, it would be more appropriate, from the strict economic point of view, to give Telesat the necessary flexibility to match the overall capacity of its facilities with demand.

2. The forthcoming generation of satellites

2. The forthcoming generation of satellites

Telesat has recently completed the planning phase of their spacecraft construction program for the 1990's. The results of this planning phase were presented at a CRTC hearing held on December 17, 1985.

2.1 Market assumptions

Market studies undertaken by Telesat indicate only a modest growth (3%–5%) per year between 1985 and 2000 and with growth coming from the broadcast sector largely dependent on policy and regulatory conditions, such as authorization of new services and of reception of U.S. signals. The studies also indicated that full period channel demand is inelastic to price reductions of up to 25%, while occasional use service was shown to be very sensitive to price.

Business telecommunications on the other hand where shown to be dependent on cost effectiveness, service reliability and level of marketing effort.

As far as technical features were concerned, users were shown to be very satisfied with the present features of the Anik D series operating in the C band (6/4 GHz). Some performance improvements on the other hand were suggested in the Ku band (14/12 GHz), but the customers indicated they were not prepared to pay additional sums for extended northern coverage.

2.2 Alternative replacement scenarios

A total of 6 replacement scenarios were analyzed by Telesat and the main characteristics of these scenarios are presented in the following tables. All of the replacement scenarios were based on the concept of continuity of service for existing users and on the planned phase out of existing satellites.

	1990/1991	1993/1994
A.	SINGLE C BAND (ANIK D)	LARGE DUAL BAND (ANIK C + ANIK D)
B.	SMALL DUAL BAND (ANIK B)	LARGE DUAL BAND
C.	SINGLE C BAND (ANIK D) SINGLE KU BAND (ANIK C)	LARGE DUAL BAND
D.	LARGE DUAL BAND	LARGE DUAL BAND
E.	LARGE DUAL BAND (HIGHER POWER MODEL)	LARGE DUAL BAND (HIGHER POWER MODEL)
F.	MEDIUM DUAL BAND (ANIK D + 1/2 ANIK C)	LARGE DUAL BAND

COMMUNICATIONS PAYLOAD CHARACTERISTICS

OPTIONS	NUMBER AND TYPE OF CHANNELS	POWER PER CHANNEL
SINGLE C BAND	24 26 MHz	11W
SINGLE KU BAND	16 54 MHz	15W
SMALL DUAL BAND	12 36 MHz	11W
	6 54 MHz	15W
MEDIUM DUAL BAND	24 36 MHz	11W
	8 54 MHz	15W
LARGE DUAL BAND	24 36 MHz	11W
	6 54 MHz	15W
	16 27 MHz	5W
	4 27 MHz	15W
LARGE DUAL BAND	24 36 MHz	11W
(HIGH POWER)	6 54 MHz	15W
	20 27 MHz	15W

COMPARISON OF ALTERNATIVE REPLACEMENT PLANS

	1990/1991	1993/1994	SERVICE IMPLICATIONS
A.	SINGLE C BAND	LARGE DUAL BAND	• SEVERELY RESTRICTED KU BAND • SERVICE DE-LOADING POST 1992 • POOR 14/12 GHz RELIABILITY
B.	SMALL DUAL BAND	LARGE DUAL BAND	• RESTRICTED C BAND CAPACITY • POOR C BAND RELIABILITY • POOR PROTECTION AGAINST FAILURE
C.	SINGLE C BAND SINGLE KU BAND	LARGE DUAL BAND LARGE DUAL BAND	• HIGH COST • NO KU BAND IMPROVEMENTS UNTIL 94
D.	LARGE DUAL BAND (LOW POWER)	LARGE DUAL BAND (LOW POWER)	• KU BAND SERVICE IMPROVEMENTS • NO DTH CAPABILITY • HIGH RELIABILITY
E.	LARGE DUAL BAND (HIGH POWER)	LARGE DUAL BAND (HIGH POWER)	• ACCOMMODATES DTH • HIGH RELIABILITY • SERVICE IMPROVEMENTS
F.	MEDIUM DUAL BAND	LARGE DUAL BAND	• HIGH COST PER TRANSPONDER • POOR KU BAND PROTECTION

ECONOMIC COMPARISON OF FACILITY PLANS

	1990/1991	1993/1994	% DIFFERENCE IN PLANNING COSTS	ANNUAL RATE INCREASES
A.	SINGLE C BAND	LARGE DUAL BAND	- 8%	6-10%
B.	SMALL DUAL BAND	LARGE DUAL BAND	- 7%	8-10%
C.	SINGLE C BAND SINGLE KU BAND	LARGE DUAL BAND	+ 16%	11-15%
D.	LARGE DUAL BAND (LOW POWER)	LARGE DUAL BAND (LOW POWER)	- 1%	7-11%
E.	LARGE DUAL BAND (HIGH POWER)	LARGE DUAL BAND (HIGH POWER)	REFERENCE	1-4% 6-10% (DTH FAILS)
F.	MEDIUM DUAL BAND	LARGE DUAL BAND	-0.5%	7-11%

2.3 Analysis of replacement scenarios.

The first comment we would like to make is that Telesat made a very strong and convincing case for the need of a large dual band satellite in the 1993/1994 period, when the service life of all existing satellites will have been completely exhausted; the economies of scale in the design, BUS, and launch characteristics of a single large dual band satellite when compared to the launch of two different satellites are so important that they make the former the only possible logical choice. The members of the task force will also note that with such a satellite, a single earth station will enable users to receive television signals, while the present satellite system requires two earth stations, one pointed at Anik D-1 and

one pointed at Anik C-3; for the Rogers and Vidéotrons of this world this might not mean much, but this should prove to be fairly important with small communities. The large dual band is thus the only practical alternative for that 93/94 period, except for option E, which consists of a higher power version of the same satellite and which would permit DBS service; more about that will be said later.

The difficult choice for the next generation of satellites is the 1990/1991 period, when there will still be some capacity available from the present two generations of satellites. Leaving aside the high power dual band satellite (option E which is option D + higher power in the Ku band) for the moment, Telesat has to choose between five options which are A, B, C, D and F.

The first option which can be eliminated is option C, which consists of two satellites, one identical to Anik D and one identical to Anik C; this is so because Telesat estimates that this option would cost about 16% more than the reference option which is option E and would provide less capacity than that option; since option D costs only 1% less than option E, this means that option D is better than option C; this is so because of the lack of economies of scale in design and construction and the requirement for two separate launches. So we are thus left with options A, B, D and F.

The second option that can also be eliminated is option F, which would consist of a medium dual band satellite in 1990/1991, to be followed by the large dual band satellite in 1993/1994. Although this option costs slightly less than option E, the cost reduction is smaller (0.5%) than the cost reduction that would be incurred by option D (1.0%). So we are thus left with options A, B, and D.

Option B has to be rejected in favor of option A at least because the cost reduction incurred with the former is less than the cost reduction incurred with the latter. In addition the alternative involves poor capacity and reliability

features in the very popular 6/4 GHz band (only 12 new 6/4 GHz channels would be added) and poor protection against failures; one might end up in a situation where users might still be accommodated, but on different satellites, thus requiring multiple earth stations (possibly in both frequency bands) for users. We are thus left with options A and D.

Option A, which would see the launch of a single C band satellite (6/4 GHz) costs approximately 8% less than the reference solution; its main disadvantage from Telesat's point of view is the poor reliability for 14/12 GHz users, which could possibly face deloading in the 1991 to 1993 period when the present Anik C satellites approach the end of their design life; in addition there would be no Ku band improvements until 1994 and users would continue to need at least two earth stations during that period (one pointed at a 6/4 GHz satellite and one pointed at a 14/12 GHz satellite). In our opinion thus, Telesat has made a reasonably convincing case for the launch of two identical large dual band satellites (option D), one during the 1990/1991 period and the second one during the 1993/1994 period.

The choice that now remains is between option D and option E, the latter being identical to option D but with higher power in the Ku band (14/12 GHz), thus permitting Direct To Home (DTH) service. And Telesat estimates that the lower power version (option D) would shave only 1% off the costs of the more powerful version (option E).

2.4 Conclusions

The choice between these two options is bound to create a considerable amount of controversy, because it is a direct threat to the very existence of Cancom which is heavily committed to distribution in 6/4 GHz.

More will be said in this report about the market potential for DTH service, but one cannot but remember the day that, had the CRTC approved the Northstar

proposal which proposed service in 14/12 GHz, instead of that of Cancom, we would not have this further complication in facing the introduction of DBS services in Canada. The quasi religious debate between the two frequency band supporters has never quite died down in Canada, and with the advent of dual band satellites and more reasonable costs for higher power, we don't think it will either.

3. Policy considerations

3. Policy considerations

3.1 Telesat and Telecom Canada

When Parliament passed the Telesat Act in 1969, broadcasters and other users were envisaged to become shareholders of Telesat in addition to the original shareholders which were the Government of Canada and the telecommunications carriers. But the initial shareholder structure, which has remained in effect since then, says a lot, in our opinion, on what was thought would be the role of satellites in Canada, and on the resulting policy implications.

Satellites in these early days were perceived as a major threat to the terrestrial provision of communications services, not just in the point to multi point applications where satellites are especially effective, but even in point to point applications, satellites were thought to be a potentially important competitor to these terrestrial facilities. In short, there was widespread feeling at the time that satellites would quite rapidly play a major role in all facets of communications, be it in the carriage of voice, data and video. Even the telephone companies must have believed it themselves since they were the ones that convinced Telesat to procure three Anik C satellites.

Such a perception must have made a number of people quite nervous because it threatened to render obsolete a number of cozy arrangements in place. The Revenue Settlement Plan procedures used by Telecom Canada for example, ensures that all long distance traffic revenues between two non adjacent members (Bell and Alberta Government Telephones for example) are put into a common pot, which is then redistributed to all members not only according to the importance of traffic generated but also according to the importance of

investments made for the carriage of long distance traffic. The Prairie Provinces, who hold a reputation for bargaining aggressively for relatively high net settlement payments, must have had special concerns; suddenly, out of the blue, there was a new machine which could bypass Saskatchewan when placing a call from Montreal to Vancouver. Imagine what this could eventually do to the Revenue Settlement Plan if left uncontrolled and what that in turn could do to the local phone rates. If you were a politician or a bureaucrat in these provinces, this thing called Telesat could even make you loose your job.

In summary, policy makers were not about to let Telesat make all that easy money if it meant a complete destruction of the framework in place. So the basic policy thrust became to consider Telesat as a complementary part of the telecommunications infrastructure of this country. The notion that Telesat's major role could eventually be that of a primary vehicle for culture in Canada, and that this should perhaps be reflected in the policy framework, barely entered the mind of anyone. What did enter the mind of policy makers however was that Telesat could be used as a vehicle to pursue industrial objectives, namely the development of a space manufacturing industry.

This policy framework took the following main features:

- Telesat's rates are regulated on the telecommunications side of the CRTC and not on the broadcast side. Because there is more rigidity on that side, this leaves Telesat with a lot less flexibility to adjust rates and other marketing policies to the realities of the market place.

- It took a very long time to liberalize receive earth station ownership, a policy which kept the price outrageously high (rental fees of $25,000 per year, compared to present outright purchase

prices of $1,550–$2,000 were being proposed before the government liberalized ownership).

- Policies pertaining to the ownership and operation of uplink earth stations were and still are very restrictive.

- All that easy money, that Telesat was supposed to make, was not coming in as quickly as everyone had thought, which eventually forced Telesat to join Telecom Canada in an agreement that gave Telesat financial security but not prosperity. There was an historic battle between the CRTC and Cabinet over that issue, but eventually the position of Cabinet prevailed to the despair of many concerned but generally to no one's surprise. Telesat gained a guaranteed rate of return, equal to the average of Bell and B.C. Tel., but had to surrender in exchange its marketing functions to Telecom Canada (then the Trans Canada Telephone System or TCTS). The implied reasoning then became that all what clients could do, was request that "telecommunications services", be they broadcast or voice or data, be delivered to their doorstep, but that it was up to Telecom Canada to decide what technology would be used. And the Telecom members were not about to actively foster the development of satellite services.

- The provisions of the Telesat Act dealing with Canadian content provisions were incarnated in a company called Spar, which seemed to become the prime focus of everything the Department of Communications did. More about industrial objectives and Spar will be said later.

- Meanwhile, there was an almost total stalemate on another policy front which was the authorization of new and innovative broadcast

services, which were gaining rapid acceptance south of the border and which were particularly well suited to satellite distribution. Pay TV was inevitable we were being told, but the word "inevitable" became to be interpreted in the same context as death for human beings; death is also "inevitable" and although one's life can be taken by a speeding bus tomorrow morning, there are also good chances that death will strike the average age adult in bed, and in 30 to 40 years from now.

3.2 Re–examining the policy framework.

The task force will perhaps wish to re–examine the policy framework we have just described simply because of the fact that the underlying assumptions behind the policy framework have not materialized. Satellite facilities have not threatened the terrestrial carriage of point to point voice and data services because of rapid advances in multiplexing and other microwave technology; and they will become even less of a threat in the future with the advent of fiber optics. In that market segment, (point to point communications) satellites have thus been restricted to serving the North and other hardship cases.

Satellites on the other hand have proven to be a competitor, albeit a modest one, in the provision of point to multi point telecommunications services. This is especially true in the case of television services since these require bandwidth which is either not available or too costly with terrestrial technology. But even in the case of narrow bandwidth services satellites can compete against terrestrial facilities in point to multi point applications and would do so given an appropriate policy framework.

This would seem especially timely in the context of the recent re–negotiation of the connecting agreement between Telesat and Telecom Canada whose main

features are to limit the compensation payments paid by Telecom Canada members to $20 million per year for the 1985 to 1987 period, and to eliminate such payments after that. In exchange Telesat won back the right to market its own services.

3.3 Ownership issues.

The present ownership structure of Telesat has been described by many as providing Telesat with the worst of all worlds. On one hand Telesat is owned 50% by the telecommunications carriers, which are greatly to blame for the current excess capacity that currently plagues Telesat, notably in the 14/12 GHz band, which have shown little interest in promoting satellite technology and services, and which have managed to liberate themselves from their financial commitments to Telesat, albeit at the request of Telesat.

Telesat is also owned 50% by the Government of Canada which has shown a passionate drive to use Telesat to promote industrial objectives, namely the development of a space manufacturing industry, but has shown very little interest in promoting the financial well being of Telesat itself.

In short, half of Telesat is owned by institutions which tend to push down its revenues (the carriers) while the other half is owned by an institution which tends to push up its costs (the government).

3.4 Canadian content requirements.

Canadian content rules to which Telesat is subjected constitute for the Canadian government a legitimate political objective, but these rules have and will continue to exercise a serious impact on the long term viability of Telesat.

One could argue, rightly for that matter, that it is such rules which have contributed to the development of the space sector in Canada and the existence of companies such as Spar, SED, Comdev, Canadian Astronautics, Miller Communications and Macdonald Detwiller Associates, to name what would seem to be the most important firms, constitutes the tangible proof of the success of this policy. Such firms have achieved significant growth not only in the Canadian market but on the international scene as well.

The space sector is nevertheless a fragile entity which necessitates the constant direct or indirect support of the Canadian government, in Canada as well as abroad. This is especially true of the main component of this space sector which is Spar Aerospace Ltd.

This fragility or vulnerability of Spar has two main sources or origins. On one hand the company faces the competition of a number of foreign based companies, which frequently have at their disposal much more important human and financial resources than what is available in Canada, and which are frequently based in countries that tend to pursue the same legitimate political objectives that are being pursued in Canada, namely the development of a strong space manufacturing sector. This results in intense competition on international markets. Notwithstanding the successes achieved on the Brazil market notably, where Spar was able to sell two satellites similar to the Anik D satellites operating in the 6/4 GHz band, one has to recognize that the support of the Canadian government is always required, be it for financing conditions, cost of equipment or even financial assistance for personnel training.

Spar on the other hand also has to compete against large and vertically integrated U.S. based companies that can manufacture all the components of a satellite while Spar can only manufacture the communications payload. This constitutes in our opinion a serious and permanent handicap for Spar since,

contrary to Canada, the United States actively pursues a large military program which enables companies such as Hughes, Ford Aerospace and RCA, to name the most important, to economically develop the other components, the BUS notably, which are an integral part of satellites.

Spar is thus constantly forced to do joint ventures with firms which are in effect its biggest competitors. An every instant support from the Canadian government is thus required for the very survival of satellite manufacturing within Spar, and this every time the company makes a satellite.

While it is certainly not appropriate to decide the faith of such industrial policies in the context of the present assignment, it is nevertheless important to recognize that such policies can have a substantial impact on Telesat and ultimately on its most important market segment, the broadcasting industry. It would thus seem legitimate for the task force to point to the government that the achievement of low cost satellite services that foster the development of varied broadcast services also constitutes a legitimate policy objective, and that if the government decides it should pursue the objective of fostering the development of a strong space manufacturing sector, it should refrain from using Telesat as a vehicle, but instead use other measures (DRIE financing for example) to pursue the objective.

4. Alternatives for the future

4. Alternatives for the future

4.1 Rates, ownership and other regulatory features.

4.1.1 Peak load pricing.

As we mentioned earlier, the rates for satellite services are set, and then approved by the CRTC, to produce a given rate of return over the length of life of a satellite system that includes an in orbit spare to prevent catastrophic failure.

While we certainly view the presence of an in orbit spare as prudent management, we think that there would be advantages in permitting some flexibility in the rating process that would reflect market conditions at any given point in time.

For example, in the current context, we are faced with a fully loaded Anik D–1 satellite (6/4 GHz) while the in orbit spare, Anik D–2 is barely used. A potential new service provider is thus faced with the difficult choice of using D–2, which will generally require from its clients the purchase of a distinct earth station or moving to the Anik C system, a subject which we will address later. This means that once the operational satellite (D–1) is full, the cost of entry in the market for a new service provider becomes extremely high, while the service provider who managed to lay his hands on the last D–1 channel is a very lucky fellow indeed.

If Telesat set its rates purely according to economic theory, it would set higher rates for Anik D–1 and lower rates for Anik D–2. This pricing policy is generally referred to in economic theory as <u>peak load pricing</u> and is, by the way, exactly the principle used by Telesat for <u>occasional use</u> service where it provides prime time, non prime time and night owl rates. Even more important, this peak load pricing technique is used in the United States for

full time service, where the most popular satellites, the ones that are full with the most attractive programming, seem to be priced at higher rates than the satellites that have more excess capacity and/or are filled with less popular programming. In some cases as well operators of the "empty" U.S. satellites have offered free earth stations to potential clients in order to induce them to use their satellites. This peak load pricing technique is also used in a wide variety of other applications and industries such as long distance telephone calls, airline travel, etc.

For example, one could envisage a modest (say 1%-2%) increase on all of the 24 channels of Anik D-1, with the revenue increases passed on to unprotected preemptible service on Anik D-2 in the form of a 35% to 45% discount. The rates could be set in a way that at any given point in time, the average rate on all 6/4 GHz channels (D-1 and D-2) would be equal to the currently approved CRTC rate. As well such a pricing technique could induce some users to move from D-1 to D-2 or even an Anik C satellite, thereby freeing up capacity for potential users who really need D-1; this is especially true in the case of networking applications (the CBC, Global or other broadcasters feeding their affiliated stations) which have less of a need, if any, for all of those cable company earth stations pointed at D-1, and which could find it profitable to move to D-2 if they were given the proper economic incentive to do so.

In addition, the present regulatory environment is complicated by the presence of another satellite system (Anik C) whose rates are set independently, according to the costs of that satellite system. Again we would recommend that Telesat be authorized to introduce pricing that reflects overall market conditions, including usage characteristics on the other satellite system (Anik D) and not strictly costs of the Anik C satellite system. This would seem especially pertinent in view of the fact that within 5 years from now, we are most likely to end up with a single satellite system but with dual band

characteristics (6/4 GHz and 14/12 GHz on the same satellite); the need for all these accounting and book keeping recipes that are presently used because there are two satellite systems will thus probably disappear anyhow.

The present regulatory system fails to recognize that potential users do make rational economic choices in terms of whether or not they should use satellites, and if so which satellite system they should use. This has serious practical policy implications in terms of availability of services in underserved areas; the new French television licensee in Montreal for example is strongly tempted to use microwave carriage to other selected markets in the Province of Quebec, thereby not serving the less populous markets, because he is being sent the wrong price signals for satellite usage. And this comes at a time where there is tremendous excess capacity in the precise satellite system that would be perfect for such an application.

In addition, rates should be set so as to reflect the unique features of that frequency band, which is the possibility of providing Half Canada coverage. If one takes into account the population characteristics of Canada, one would not be surprised to find more demand for eastern Canada channels than for western Canada channels. We are thus saying that should 14/12 GHz rates be lowered, the price reductions should be more important on the western beam than on the eastern beam. Again this would be entirely consistent with sound economic theory and good business practice.

What all these recommendations amount to is a <u>major</u> policy and regulatory change that would essentially move Telesat from the Telecommunications side of the CRTC to its Broadcasting side, where there is still regulation but where the rules and procedures are much simpler and flexible. This would do away with one of the major ironies of the present situation where the dominant feature of Telesat is clearly its role in broadcasting but where rates are set as though broadcasting did not exist and telecommunications (in the

regulatory sense) was the only game in town.

The CRTC would still regulate the overall rate of return of Telesat, set maximum rates and ensure that there is no discrimination amongst users of a single satellite (if Anik D–1 is chosen to be the "peak" satellite, then all users on that satellite should be charged the same price, regardless of anything else). Apart from these simple logical and economically consistent rules, Telesat would be free to do anything else it might want to do in terms of rates reductions on non peak satellites or non peak beams, the provision of free earth stations for new service providers and so on. In fact Telesat has already begun to go in that direction with its discount package for new satellite delivered applications; the proposed approach though would remove the discriminatory aspects against existing users of satellite services.

We say this would amount to a major policy and regulatory change, not only because of rate making per se, but most important because it would put back into question Telesat's ownership by the telecommunications carriers and its membership in Telecom Canada. But then, if Telesat barks and wags its tail to the tune of the broadcasting industry, why would anyone want to argue that it is a telecommunications animal.

4.1.2 Rates for partial channels

Taking into account what has been said about rates for partial channels in section 1.5, we think it would be appropriate for the task force to recommend that rates for this category of service be amended to include the possibility of including non preemptible as well as preemptible service; we feel the present rate structure discriminates against the radio broadcasting industry

4.1.3 Ownership issues

The questions of the ownership of Telesat are especially pertinent since the

present government has declared its intention to privatize or sell off many of its holdings in the Canadian economy, including its telecommunications holdings. In that context, it has already started the process of selling off its interest in Teleglobe and the next logical candidate for the privatization process ought to be Telesat.

What we would hope to do in the current section is to outline the various ownership scenarios that would be plausible for Telesat and to subject those scenarios to public policy and effectiveness criteria. We will thus examine:

- the government's role in Telesat.
- the carrier's role.
- the possible role of "others".

a) The government's role in Telesat.

Although this option would run contrary to the government's privatization intentions, it still sounds logical to consider it in the context of the importance of Telesat's role in broadcasting. Some have argued that Telesat should be considered a public utility, such as roads, and that as such government could rightly be the sole owner of that facility. It could then set rates that would accomplish its policy objectives in the area of broadcasting.

The major weakness behind that approach is that if fails to recognize that satellite services are just one of the many intermediate inputs that go into a broadcasting service, and that, although significant in the Canadian case, the cost of satellite services usually takes second place well behind the creation of content. From a public policy point of view as well, we tend to favor measures that subsidize, when needed, the final output, that is a broadcasting

service as a whole including its satellite distribution, instead of subsidizing one or many of the intermediate inputs. We believe that this makes way for more responsible public policy in a democratic society, because the areas of intervention of government and their associated costs can be identified more readily and easily; the issue of government support in the provision of broadcast services is addressed further in the present chapter.

In addition, if such an option generated artificially low rates for satellite services, this would introduce an uneconomic bias in favor of satellites against competing terrestrial technologies. As well, we believe that such an option would create even more pressure than already exists in the area of Canadian content requirements for hardware and we feel that, again on the public policy front, this would not be entirely desirable.

In conclusion if it comes down to choosing between increasing or decreasing the government's role in Telesat, we definitely favor the latter.

b) The role of the carriers.

The carriers themselves have proposed to acquire the government's share of Telesat and there have also been proposals to link this share to any sale of the government's assets in Teleglobe, which would as well increase the role of the carriers in Telesat.

Considering the fact that Teleglobe is presently generating substantial profits, such an option is obviously appealing to bureaucrats and politicians which have a natural tendency to attempt to solve problems in this "dust under the carpet" fashion.

While this is not exactly the right place to address public policy issues surrounding Teleglobe, we will nevertheless point out that one of the greatest challenges confronting the future owner of Teleglobe in the coming years will

be to bring its own rates closer to the rates of its major international competitors in the overseas telecommunications market. In short were are not entirely sure that those fat profits will be available to subsidize Telesat rates. And besides, such an alternative would run contrary to other public policy objectives in the areas of fiscal responsibility and avoiding uneconomic bias against or in favor of a particular technology or class of intermediate inputs.

Nevertheless, even in the absence of the Teleglobe context, the carriers have, as we said, expressed their desire to purchase the government's share of Telesat. One can argue that if they were the sole owners, they would take more interest in it than they presently do and consequently would manage it properly. In the event that they would not manage it properly (inciting Telesat to purchase excessive satellite capacity for example), they could be held responsible for it. But the proposal also has weaknesses in that it would give total control of satellite facilities that have proven to be over the years competitors of terrestrial facilities and not the complement they were once thought to be. And in addition we would loose forever the opportunity of regulating rates for satellite services on the broadcast side of the CRTC, as we have argued, rather than on its telecommunications side.

In summary, if it comes to the choice of increasing or decreasing the role of the carriers we favor the latter. On the other hand if we have to choose between more carrier involvement or more government involvement, we would favor the former.

c) The role of others.

If we have little appreciation for more government or carrier involvement, then the only possibility that remains is to increase the involvement of other segments of the Canadian economy. This would be consistent with the original

intention behind the creation of Telesat where it was envisaged that broadcasters and possibly other users of satellite technology would purchase a share of Telesat. The problem with this alternative is that there are not many players in these other segments of the Canadian economy which are willing, or in some cases have the sufficient motivation, to put together a financial package that would give them a significant interest in Telesat. The problem is that the present financial situation of Telesat, if definitely not critical in our opinion, is nevertheless serious; years of policy and regulatory lengthy delays in giving approval to new broadcast services, of bad pricing policies, of purchases of excessive capacity and of strict Canadian content requirements have left an undeniable mark on the balance sheet of the company.

The ownership of Telesat is in our mind a vital question for the long term development of the broadcasting sector in Canada, but there are no easy solutions.

4.2 Revenue incentives.

4.2.1 The DBS market.

There have been numerous studies undertaken for Telesat and the Department of Communications that have identified a market segment of approximately 1 to 1.2 million households in Canada which cannot be economically served by cable, even in the long run.

This represents a significant market opportunity for the development of DBS services that would serve this market segment in addition to the communities served by cable. The problems associated with this opportunity are related to costs; as we saw earlier in this report, the use of Anik C in the 1 TV per carrier mode, which would be suitable for direct reception, would double the

costs of providing full Canada coverage from $2.3 million to $4.5 million per year for unprotected non preemptible service. And those 1986 rates would go up to $5.6 million per year by 1990. It thus becomes extremely difficult for a user to justify the costs of moving from the 2 TV per carrier mode to the 1 TV per carrier mode. And besides, a single service transmitted in a DBS mode would not be enough to create a DBS market; one would have to envisage a fully loaded Anik C (8 channels per beam) which would represent additional costs of slightly more than $9 million per year per half Canada beam or $18 million for full Canada coverage.

But the feat is not impossible if one assumed a retail price of $20/ month for a package of 8 signals, including $5 to $10/month flowing to pay for the additional satellite costs. Under such a scheme there would be a requirement for the existence of between 150,000 to 300,000 DBS subscribers for the proposal to break even.

This is the kind of proposal currently considered by Telesat through its Anikasting subsidiary, and for which it has undertaken discussions with a number of parties including Cancom. While the proposal raises a number of policy questions, most of which are related to Telesat's role in the proposal, the most important issues are related to the competitive nature between the services that would be provided under this proposal and the services currently provided by Cancom.

When dealing with the possibility of DBS services in Canada, we urge the task force members to remember that the issue is one of money and profits and perhaps the very survival of Cancom and very little else. The basic problem confronting Cancom is that they have committed themselves to using the Anik D system operating in 6/4 GHz which makes the DBS alternative even more costly to consider.

The DBS alternative becomes even more tempting if one considers the features associated with the next generation of satellites. During recent CRTC hearings on Telesat's construction plan, the company presented, as we said earlier, a fairly convincing argument in terms of a dual band medium power satellite being the most logical and economical choice for this forthcoming generation. The final choice seems to be between this medium power dual band satellite (not very well suited for DBS reception), and an identical but higher power dual band satellite which would be well suited for direct reception. And the lower power version would shave only 1% off the capital costs of the high power version. What this all boils down to is that the DBS alternative in the next generation of satellites will not involve a doubling of transponder costs as it does with the current generation of satellites.

Finally, we would also like to point out that the proposed modifications to the pricing of satellite services outlined in the preceding section (4.1) would have an impact on the economic viability of DBS services if those proposals resulted in lower rates for non peak satellites.

4.2.2 Other revenue incentives.

Telesat's facilities can also be used to carry other telecommunications services, most notably in the areas of voice in data. Although the context of the present task force is not the right place to deal with those questions, we will nevertheless point out that there could be policy and regulatory developments that could have a positive impact on Telesat's revenues. The decision to eventually permit competition in the long distance market could create market opportunities that do not presently exist. We have said earlier that satellites cannot compete on a very broad front with terrestrial facilities but nevertheless Telesat is bound to gain a respectable market share in that area when it is permitted to do so, especially if rates for partial RF

channel service are set in a more realistic manner.

4.3 Costs reductions.

While the object of the task force is clearly not to put into question policies that apply to sectors other than broadcasting, we think that it is clearly part of its mandate to address the issue of how such policies affect broadcasting and to suggest changes as to how these policies are implemented while leaving their objects intact.

It would thus be appropriate for the task force to recommend that appropriate and alternative measures be developed so that Canadian content requirement in terms of hardware do not have the effect of increasing the rates charged by Telesat to its users. This would be consistent with sound public policy because the induced cross subsidization policy that is implicit in the Telesat Act tends to hide the real costs associated with the pursuit of the industrial policy on one hand and has negative effects on the pursuit of other policies such as the development of varied television services on the other hand.

4.4 Subsidies to users.

If everything else fails, then there remains the possibility of subsidies to users. But to be consistent with ourselves we think these should aim at the overall provision of services and not at satellite charges per se which, although significant, are not the only factor affecting the development of television services in Canada; content creation, to name the most obvious factor, would be equally as important in terms of determining the ability of a

service to make it in the marketplace.

The subsidiary Economic and Regional Development Agreement (ERDA) on communications signed between the governments of Canada and Quebec has specifically mentioned the development of television services as one of its objectives; an applicant could thus submit a proposal, in the framework of that agreement, that would seek government funding to cover the high start up costs (including but not specifically limited to satellite costs) of a television service. The task force might wish to consider this kind of approach, that we view as being more sound in terms of public policy, because it makes for easier recognition of the costs associated with the pursuit of policy objectives that pertain to the development of television services in Canada.

4.5 Telesat's financial situation.

Telesat's financial situation is described with the help of a few graphs in Appendix A. Although that situation is not entirely rosy, it is very far from the pessimistic picture that is often being painted about the company, and which could often be equated with some form of terminal cancer.

It is true that substantial Telecom Canada payments have been needed since 1983 to maintain the company's rate of return, but we think that the year 1983 was the worst year, with payments reaching $28 millions. One has to remember that on one hand, this is the year that substantial capital expenditures, in the form of new satellites, entered the books of Telesat, and that on the other hand, rates were structured on an ascending scale, which hurts short term profits but can dramatically improve these profits in the longer term. With much lower capital expenditures since 1983, Telesat has been able to achieve significant reductions in long term debt, and we forecast that this process will continue in the next two to three years, until Telesat has to face another round of major capital expenditures associated with the

next generation of satellites.

In the coming years as well, we have identified three factors which could further improve Telesat's financial picture. The first two factors are the possibilities of DBS services on one hand and more competition in the telecommunications industry on the other hand. Both of these factors could have a positive impact on Telesat.

But the third factor is really our favorite, since being outside of Canadians control, it will be difficult for us to mess up things, as we sometimes have the tendency to do in the area of broadcasting. That third factor is scrambling on U.S. satellites which has already started for some services such as pay TV and which is expected to become widespread for discretionary services in general. This, in our opinion, will greatly improve the economics of existing and new Canadian discretionary services, which in turn will have a positive effect on Telesat.

But as we mentioned, Telesat will have to face its moment of truth when it faces major capital expenditures associated with the next generation of satellites, and this time the Telecom safety net will not be around to reduce the impact of any mistake. It would thus seem especially pertinent for the task force to point out to the policy makers and the regulators that a proper policy and regulatory framework is essential, if one wants to avoid the difficulties of the past.

We stand on the side of those who think that the Telesat patient does not need major surgery in the form of a merger with Teleglobe or any other form of increase in the domination of carriers. We believe that the patient has been intentionally deprived of oxygen by owners and policy makers alike, and that with a simple dose of that basic raw material of life, the patient could show some very surprising strength. But with the launch of a new generation of

satellites rapidly approaching, there is not much time left.

Appendix A

Telesat Financial Data

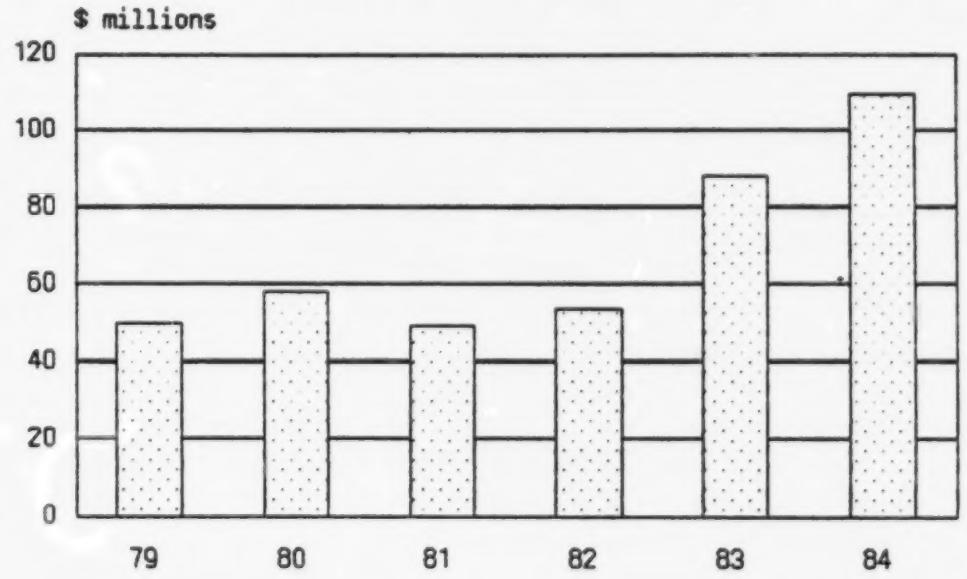
Econotec

SELECTED TELESAT FINANCIAL DATA

	1979	1980	1981	1982	1983	1984
INCOME STATEMENT						
REVENUES	$ 49,842	$ 57,782	$ 49,424	$ 53,822	$ 88,082	$ 109,170
INC. BEF. SETTL.	$ 13,623	$ 18,130	$ 20,570	$ 17,565	$ (2,191)	$ 15,127
SETTLEMENT	$ 0	$ 0	$ 1,825	$ 5,185	$ 28,033	$ 18,820
INC. AFT. SETTL.	$ 13,623	$ 18,130	$ 22,395	$ 22,750	$ 25,842	$ 33,947
INCOME TAXES	$ 4,362	$ 5,870	$ 7,318	$ 6,040	$ 12,656	$ 17,049
NET EARNINGS	$ 9,261	$ 12,260	$ 15,077	$ 16,710	$ 13,186	$ 16,898
EXTR. ITEM	$ 0	$ 0	$ 0	$ 0	$ 2,304	$ 0
NET EARNINGS	$ 9,261	$ 12,260	$ 15,077	$ 16,710	$ 15,490	$ 17,049
BAL. SHEET DATA						
SHRDL. EQUITY	$ 88,962	$ 97,622	$ 107,899	$ 118,609	$ 128,099	$ 141,997
LONG TERM DEBT	$ 41,000	$ 80,950	$ 139,900	$ 191,275	$ 179,507	$ 141,867

Telesat Canada

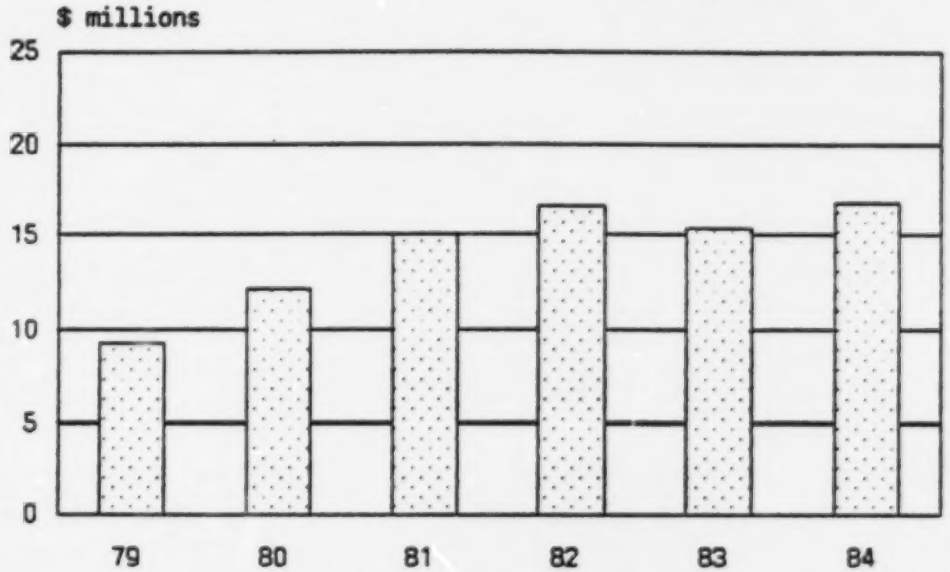
Revenues from 1979 to 1984



After a relatively slow growth period from 79 to 82,
Telesat's revenues have increased significantly since 1983
after the introduction of discretionary services was finally permitted

Telesat Canada

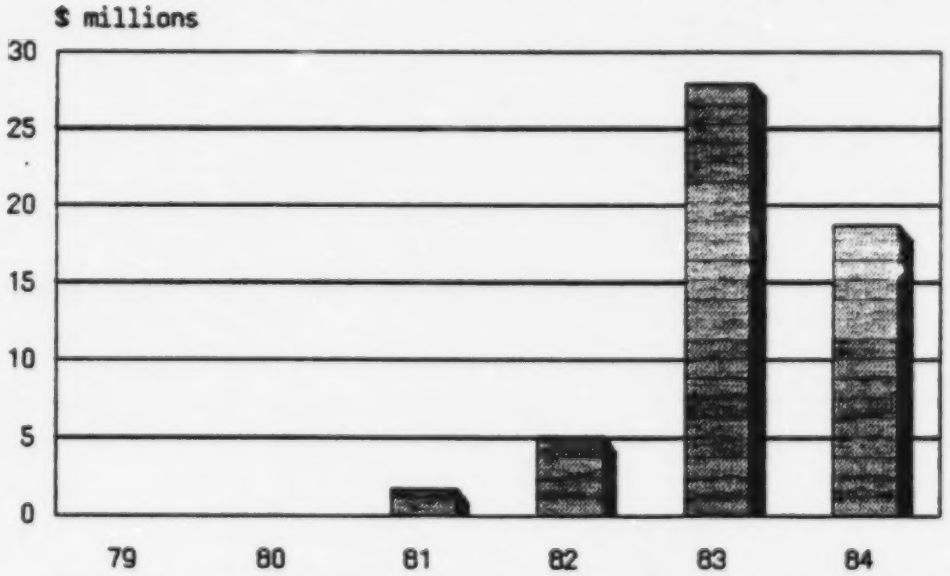
Net income for the 1979 to 1984 period



Net income has stabilized to
approximately $16 to $17 million since 1981

Telesat Canada

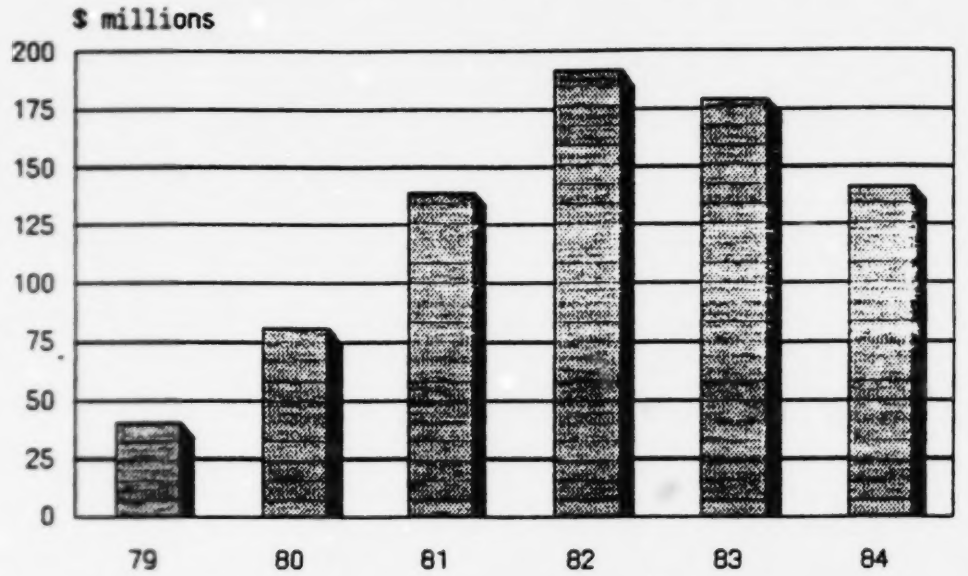
Telecom payments under the connecting agreement



But this has been achieved with the help of substantial
Telecom Canada payments which have reached $28M in 83

Telesat Canada

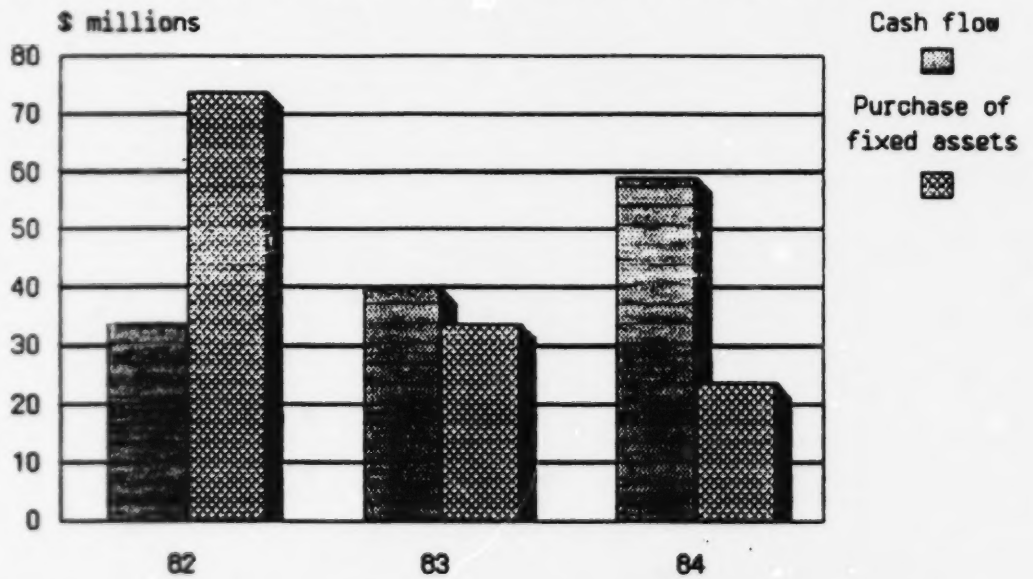
Long term debt for the 1979 to 1984 period



The launch of new satellites has also caused long term debt to increase to more than $190 million in 1983

Telesat Canada

Cash flow and purchase of fixed assets for the 82 to 84 period



More long term debt reductions can be expected since cash flow will exceed the acquisition of assets in the coming years

Appendix C
Rates for partial channel use

Notes on rates for Partial RF Channel Service

Rates for Partial RF service are only offered for full time use and only in the fully protected mode.

The rates specified are based on one percent (1%) increments; therefore, the customer's total charges would be determined by multiplying the applicable rates associated with the customer's total percentage utilization in the appropriate utilization category, times the total utilization.

For example, a customer utilizing 45% of a 6/4 GHz channel would be charged a monthly rate of $111,600 ($2,480 X 45).

Rates for Partial RF Channel Service
Monthly charges per 1% increment per utilization category
6/4 GHz space segment

PERCENT UTILIZ.			1/01/86 TO 12/31/86	1/01/87 TO 12/31/87	1/01/88 TO 12/31/88	1/01/89 TO 12/31/89	1/01/90 TO 12/31/90
1	TO	5	$ 2,775	$ 2,928	$ 3,089	$ 3,259	$ 3,438
6	TO	10	$ 2,738	$ 2,889	$ 3,047	$ 3,215	$ 3,392
11	TO	15	$ 2,701	$ 2,850	$ 3,006	$ 3,172	$ 3,346
16	TO	20	$ 2,664	$ 2,811	$ 2,965	$ 3,128	$ 3,300
21	TO	25	$ 2,627	$ 2,771	$ 2,924	$ 3,085	$ 3,254
26	TO	30	$ 2,590	$ 2,732	$ 2,883	$ 3,041	$ 3,209
31	TO	35	$ 2,553	$ 2,693	$ 2,842	$ 2,998	$ 3,163
36	TO	40	$ 2,516	$ 2,654	$ 2,800	$ 2,954	$ 3,117
41	TO	45	$ 2,480	$ 2,616	$ 2,760	$ 2,912	$ 3,072
46	TO	50	$ 2,461	$ 2,596	$ 2,739	$ 2,890	$ 3,049
51	TO	55	$ 2,442	$ 2,576	$ 2,718	$ 2,867	$ 3,025
56	TO	60	$ 2,424	$ 2,557	$ 2,698	$ 2,846	$ 3,003
61	TO	65	$ 2,405	$ 2,537	$ 2,677	$ 2,824	$ 2,979
66	TO	70	$ 2,387	$ 2,518	$ 2,657	$ 2,803	$ 2,957
71	TO	75	$ 2,368	$ 2,498	$ 2,636	$ 2,781	$ 2,934
76	TO	80	$ 2,349	$ 2,478	$ 2,614	$ 2,758	$ 2,910
81	TO	85	$ 2,330	$ 2,458	$ 2,593	$ 2,736	$ 2,886
86	TO	90	$ 2,313	$ 2,440	$ 2,574	$ 2,716	$ 2,865
91	TO	95	$ 2,295	$ 2,421	$ 2,554	$ 2,695	$ 2,843
96	TO	100	$ 2,276	$ 2,401	$ 2,533	$ 2,673	$ 2,820

Rates for Partial RF Channel Service
Monthly charges per 1% increment per utilization category
14/12 GHz space segment

PERCENT UTILIZ.			1/01/86 TO 12/31/86	1/01/87 TO 12/31/87	1/01/88 TO 12/31/88	1/01/89 TO 12/31/89	1/01/90 TO 12/31/90
1	TO	5	$ 2,019	$ 2,130	$ 2,247	$ 2,371	$ 2,501
6	TO	10	$ 1,992	$ 2,102	$ 2,217	$ 2,339	$ 2,468
11	TO	15	$ 1,967	$ 2,075	$ 2,189	$ 2,310	$ 2,437
16	TO	20	$ 1,939	$ 2,046	$ 2,158	$ 2,277	$ 2,402
21	TO	25	$ 1,912	$ 2,017	$ 2,128	$ 2,245	$ 2,369
26	TO	30	$ 1,885	$ 1,989	$ 2,098	$ 2,213	$ 2,335
31	TO	35	$ 1,858	$ 1,960	$ 2,068	$ 2,182	$ 2,302
36	TO	40	$ 1,830	$ 1,931	$ 2,037	$ 2,149	$ 2,267
41	TO	45	$ 1,803	$ 1,902	$ 2,007	$ 2,117	$ 2,234
46	TO	50	$ 1,790	$ 1,888	$ 1,992	$ 2,102	$ 2,217
51	TO	55	$ 1,778	$ 1,876	$ 1,979	$ 2,088	$ 2,203
56	TO	60	$ 1,763	$ 1,860	$ 1,962	$ 2,070	$ 2,184
61	TO	65	$ 1,751	$ 1,847	$ 1,949	$ 2,056	$ 2,169
66	TO	70	$ 1,738	$ 1,834	$ 1,934	$ 2,041	$ 2,153
71	TO	75	$ 1,723	$ 1,818	$ 1,918	$ 2,023	$ 2,134
76	TO	80	$ 1,709	$ 1,803	$ 1,902	$ 2,007	$ 2,117
81	TO	85	$ 1,697	$ 1,790	$ 1,889	$ 1,993	$ 2,102
86	TO	90	$ 1,682	$ 1,775	$ 1,872	$ 1,975	$ 2,084
91	TO	95	$ 1,670	$ 1,762	$ 1,859	$ 1,961	$ 2,069
96	TO	100	$ 1,657	$ 1,748	$ 1,844	$ 1,946	$ 2,053

Appendix D

Comparison with U.S. rates

6/4 GHz SATELLITE SERVICES: CANADIAN vs U.S. RATES ($ x 000)
(Note 1)

Type of Service	WESTERN UNION TRANSPONDER SERVICE RATES $US [$Cdn]*					TELESAT CANADA RF CHANNEL SERVICE RATES
	Fixed Term (In effect 83-10-10) (Note 2A)	Month to Month (In effect 83-10-10)	Video Channel Transmission (In effect 83-10-10)	Multi-Transponder Term (In effect 83-10-10) (Note 2B)	Sale of Transponders (Note 3)	(In effect on interim basis 84-09-01)
Protected-Dedicated	$173 [224]	---	---	---	---	$174
Protected-Designated (Note 4)	$130 [169]	$150 [195]	$110 [143]	---	---	---
Unprotected Non-Preemptible	$ 96 [125]	$130 [169]	---	1984 = $100 [130] 1985 = 109 [141] 1986 = 117 [152] 1987 = 125 [163] 1988 = 134 [174] 1989 = 142 [185] 1990 = 150 [195]	$ 9,000 [11,700]	$122
Unprotected Preemptible	$ 76 [99]	$110 [143]	---	1982-1987 = $67 [87] 1988 = $73 [95] 1989 = 80 [104] 1990 = 87 [113]		$110

* A conversion rate of 1.3 was used to convert U.S. rates to Cdn. dollars.

6/4 GHz SATELLITE SERVICES: CANADIAN vs U.S. RATES ($ x 000)
(Note 1)

Type of Service	RCA AMERICOM TRANSPONDER SERVICE RATES $US [$Cdn]*			TELESAT CANADA RF CHANNEL SERVICE RATES
	Fixed Term (1988) (In effect 83-09-26)	Fixed Rate 1989 Term (In effect 83-09-26) (Note 5)	Multiple Preemptible (In effect 84-05-31) (Note 6)	(In effect on interim basis 84-09-01)
Protected	1984 = $138 [179] 1985-88 = 142 [184]	$13,000 [16,900]	---	$174
Unprotected Non-Preemp.	1984 = $102 [133] 1985-88 = 106 [137]	---	---	$122
Unprotected Preemptible	1984-88 = $ 67 [87]	---	$67 [87] 1 Transponder, 84-01-01 - end of term $63 [81] 2 or more Transponders, 83-11-01 - end of term	$110

* A conversion rate of 1.3 was used to convert U.S. rates to Cdn. dollars.

6/4 GHz SATELLITE SERVICES: CANADIAN vs U.S. RATES ($ x 000)
(Note 1)

Type of Service	RCA AMERICOM TRANSPONDER SERVICE RATES $US [$Cdn]* — Market Period II - Fixed Rate (Note 7A) — Single Transponder Services: 1988 Service (In effect 84-02-05)	1988 Service With Receive-Only Earth Stations (In effect 84-02-05 (Note 7B)	1988 Preemptible /Protected Service (In effect 84-02-05)	1986 Service (In effect 84-02-05)	Multiple Transponder Service (In effect 84-02-05) (Note 8)	Market Period II Transponder Service (In effect 84-01-03)	TELESAT CANADA RF CHANNEL SERVICE RATES (In effect on interim basis 84-09-01)
Protected	$130 [169] (start of service - 85-12-31) $135 [176] (86-01-01 88-12-31)	$135 [176] (start of service - 88-12-31)	$135 [176] (Upgraded from Unprotected Preemptible Service, 86-01-01 88-12-31)	$135 [176] (start of service - 86-12-31)	$135 [176] (86-01-01 - 88-12-31)	$150 [195]	$174
Unprotected Non-Preemp.	-------		-------	-------	----------	-------	$122
Unprotected Preemptible	-------		$67 [87] (Start of service - 85-12-31, then upgraded to Protected Service)	-------	$63 [81] (Start of service - 85-12-31, then upgraded to Protected Service)	-------	$110

* A conversion rate of 1.3 was used to convert U.S. rates to Cdn. dollars.

NOTES

Note 1 - Unless otherwise specified, rates are expressed in Monthly amounts.

Note 2 - A) Service is provided to customers whose term, initial or extension, is 2 years.
B) Service is provided on the Westar V satellite for an initial 3-year period with option to renew for two additional successive 3-year terms and to take service on a month-to-month basis thereafter.

Note 3 - $9 Million charge was verbally provided to Telesat on 1981-05-28. To Telesat's knowledge, this charge is not on the public record. Rate applies to the equivalent of an Unprotected Non-Preemptible transponder on Westar IV or V (service life is estimated at 10 yrs.)

Note 4 - In this form of protection, W.U. will not reserve a specific replacement transponder, but for each four primary transponders (or less) W.U. will reserve a transponder for use in the event of failure of one of the four primary transponders. The first customer whose primary transponder fails will have use of this replacement transponder. The remaining customers will be assigned another protection transponder if available, or will be reclassified to an Unprotected status.

Note 5 - The rate is $13 million on a present value basis. Payment may be made on the basis of a full payment of $13 million, or an initial payment of $1.5 million. In the latter case, all payments shall equal $13 million, on a present value basis, using a 15% discount rate and monthly compounding periods. The sum of the initial payment plus additional payments shall not total less than $4 million after the 1st 3 years on a present value basis.

Note 6 - Multiple Preemptible Transponder Service (MPTS) is available on a full-time, preemptible basis for a minimum non-cancellable term of five years commencing with the service start date of the customer's first transponder and ending for all transponders at the conclusion of five years from that date.

Note 7 - A) Service is available on Satcom IV on a single or multiple transponder basis for non-cancellable terms commencing no later than 84-12-31 and terminating 88-12-31.
B) Customers obtaining service under this offering for television transmission will be provided receive-only earth stations without additional charge.

Note 8 - This service consists of one protected transponder provided under the Single Transponder 1988 Service or the 1988 Service with Receive-only Earth Stations and two preemptible/protected transponders for a non-cancellable period commencing no later than 84-12-31 and terminating on 88-12-31.

14/12 GHz SATELLITE SERVICES: CANADIAN vs U.S. RATES ($ x 000)
(Note 1)

	SATELLITE BUSINESS SYSTEMS (Note 2) Transponder Capacity Service Rates $US [$Cdn]*				TELESAT CANADA RF CHANNEL SERVICE RATES
Type of Service	Service Position	Availability Period	Full Term Rate (In effect 82-08-17)	Monthly Rate (In effect 82-08-17)	In effect 84-02-20 to 85-06-30 (Note 3)
Protected	---	---	---	---	$121 2 x = 242
Unprotected Non-Preemptible	---	---	---	---	$85 2 x = 170
Unprotected Preemptible	3	82-01-01 - 84-12-31	$6,912 [8,986]	$192 [$250]	$77 2 x = 154
	2	" "	6,012 [7,816]	167 [217]	
	1	" "	5,400 [7,020]	150 [195]	

* A conversion rate of 1.3 was used to convert U.S. rates to Cdn dollars.

NOTES

14/12 GHZ SATELLITE SERVICES: CANADIAN vs U.S. RATES

Note 1 - SERVICE COMPARISON

SATELLITE BUSINESS SYSTEMS (SBS)	TELESAT CANADA
i) Transponder Bandwidth And Capacity: - Each transponder is 43 MHz - Can accommodate 2 Television Program Signals	i) RF Channel Bandwidth and Capacity: - Each RF Channel is 54 MHz - Can accommodate 2 Television Program Signals
ii) Transponder Capacity Service (TCS): - See (i) above	ii) RF Channel Service: - 27 MHz Bandwidth and 1/2 the TWTA Power - Service can accommodate 1 Television Program Signal
iii) Service Coverage: - Continental USA - No Spot Beam Coverage - Earth Station Antenna size will generally be larger than Telesat's Anik C earth stations, because the beams on the SBS satellite have less power.	iii) Service Coverage: - 1/4 Canada and 1/2 Canada Beams. - Earth Station Antenna sizes will be generally be smaller on Anik C, as compared to the SBS satellite, because the 1/4 Canada and 1/2 Canada beams have greater power.
iv) Preemptibility: - TCS is essentially a Double Preemptible Service in that it can be preempted to restore Customer Network Service, which is SBS' primary service offering, and depending upon the service position, to restore other TCS transponders. Each TCS Service Position is a right to use a TCS transponder on a preemptible basis and includes the associated order of preemption. Initially 6 service positions were made available, however positions 6, 5 and 4 were deleted, effective 82-08-17.	iv) Preemptibility: - Telesat's Unprotected, Preemptible RF Channel Service is preemptible only to restore Fully Protected RF Channel service.

Note 2 - If a meaningful comparison is to be made between Telesat's RF Channel Service (at 14/12 GHz) and SBS' Transponder Capacity Service, a complete end-to-end Service Costing Study should be undertaken which would include the associated earth segment costs.

Note 3 - Escalating Rate Periods beyond 85-06-30 are as follows:

85-07-01 - 85-12-31		88-01-01 - 88-12-31	
86-01-01 - 86-12-31		89-01-01 - 89-12-31	
87-01-01 - 87-12-31		90-01-01 - 90-12-31	

For corresponding escalating rates, refer to Telesat's General Tariff CRTC 8001.